Maline Creek
Whole Body Contact Recreation
Use Attainability Analysis

July 2005

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I. INTRODUCTION

In September 2000, U.S. EPA Region VII (EPA) notified Missouri Department of Natural Resources (MDNR) that several items contained within Missouri's Water Quality Standards were inconsistent with the intent of the Federal Clean Water Act of 1972 (CWA). EPA noted that MDNR's limited designation of streams for swimming uses was inconsistent with the CWA. Section 101(a)(2) of the CWA establishes as a national goal "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water," wherever attainable. This goal presumes that all waters should be suitable for fishing and swimming unless these uses are unattainable per 40 Code of Federal Regulations (CFR) 131.10. The MDNR currently designates only 10% of Missouri's classified waters as having Whole Body Contact Recreation (WBCR) uses (swimming).

In response to concerns raised by EPA, MDNR is proposing WBCR use designation of all classified waters listed in State regulations. However as allowed by federal regulations, a Use Attainability Analysis (UAA) may be conducted to determine if WBCR use is an appropriate and attainable use for a specific waterbody.

A UAA is a structured scientific assessment of the factors affecting use attainment, which may include physical, chemical, biological, and economic factors. If a designated use is not an existing use attained on or after November 28, 1975, one of the following attainability factors must justify the removal or downgrading of a designated use (from 40 CFR 131.10(g)):

(1) Naturally occurring pollutant concentrations prevent the attainment of the use;

(2) Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for with sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met;

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;

(4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modifications in a way that would result in the attainment of the use;

(5) Physical conditions related to the natural features of the water body, such as lack of proper substrate, cover, flow, depth, pools, riffles, and the like unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by Title III Sections 301 and 306 of the CWA would result in substantial and widespread economic and social impact.

MDNR, in cooperation with State, Federal, Municipal, and private entities, developed a recreational UAA protocol for Missouri waters. This recreational UAA framework addresses use attainability factors that may allow removal or downgrading of WBCR uses for specified waterbody segments. Missouri WBCR UAAs may include, but are not limited to: field observations of swimming areas, sampling for pathogenic indicator bacteria, and interviews of nearby residents to determine historic recreational use.

The Metropolitan St. Louis Sewer District (MSD) is interested in determining whether or not WBCR is an existing or attainable use for Maline Creek. Ongoing combined sewer overflow (CSO) control planning efforts should be founded on realistic and achievable goals for area receiving waters. MSD is concerned about potentially expending excessive public financial resources in pursuit of a WBCR goal if it is not attainable. To address these concerns, Maline Creek, a classified intermittent tributary to the Mississippi River receiving urban runoff and CSO discharges, was evaluated for existing, potential, and attainable WBCR uses. Field surveys were conducted in October 2004. The assessment described herein is expected to meet or exceed the requirements set forth by MDNR in available UAA protocols for evaluating recreational uses (MDNR 2004).

II. STUDY AREA

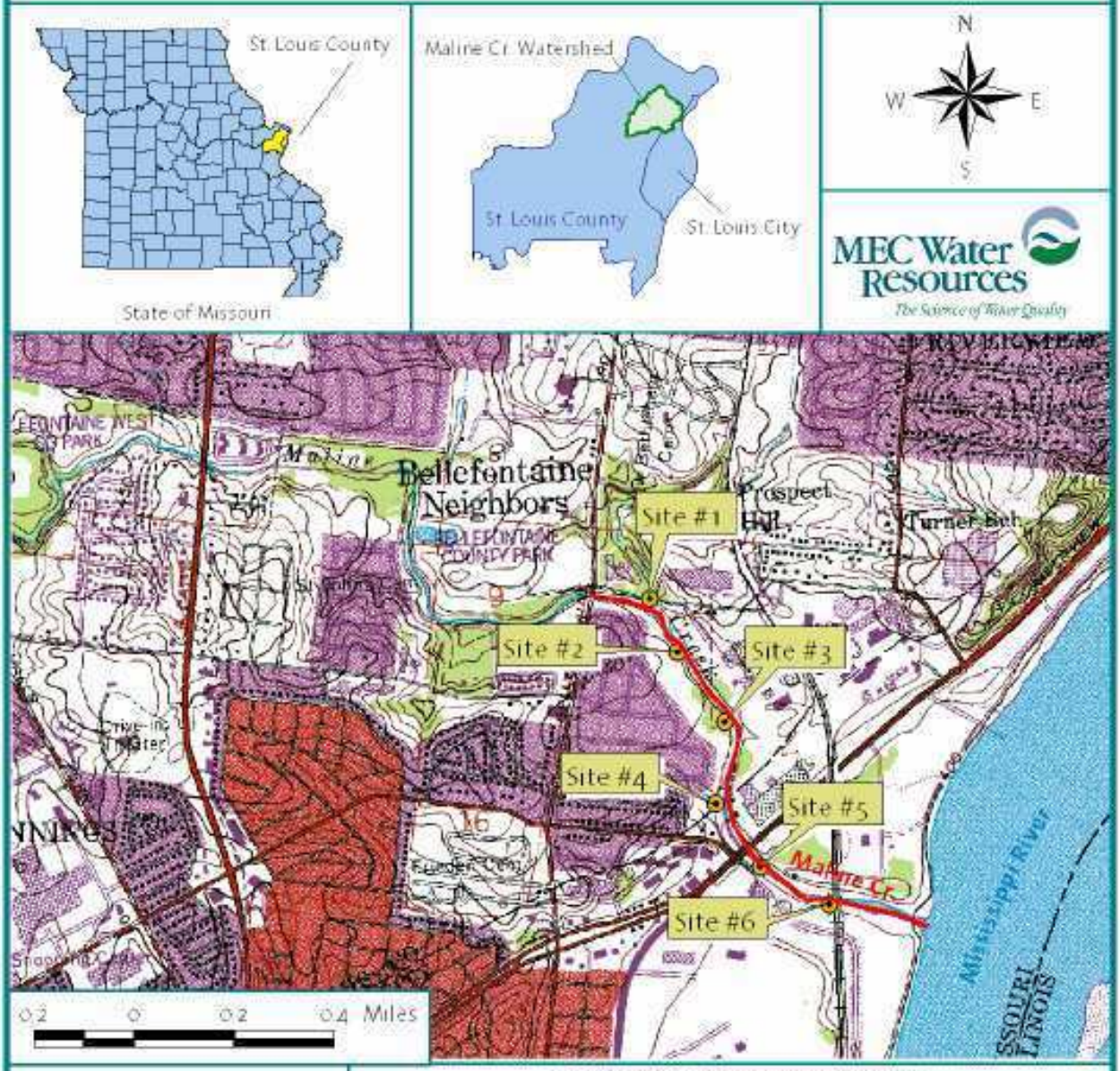
A one-mile segment of Maline Creek (Figure 1) is a Class C Water of the State and an intermittently flowing tributary to the Mississippi River (Blunt 2004). Beneficial uses currently designated for Maline Creek include: Protection of Warm-Water Aquatic Life, Livestock and Wildlife Watering, and Human Health protection (Fish Consumption and Secondary Contact Recreation). Draining a 25.1 $mi.^2$ urbanized watershed in northeast St. Louis County, landuses of Maline Creek are 59% residential, 13% public, 9% undeveloped, 11% commercial or industrial, 7% recreational, and 1% transportation (SSPC 2002). Overall, the Maline Creek watershed is composed of 32% impervious area resulting in increased stormwater runoff volumes and peak flows (SSPC 2002). The Maline Creek watershed is contained within the larger Cahokia-Joachim catchment (8-digit HUC 07140101) and State assigned waterbody identification number is 1709.

III. METHODS AND MATERIALS

Procedures developed by MDNR for conducting recreational UAAs were the primary reference for this study (MDNR 2004). In summary, MDNR UAA procedures contain the minimum elements listed below:

- Surveys should generally be conducted during the regulatory recreational season (April 1 to October 31);
- Surveys should be conducted during baseflow conditions;
- Recreational assessments should be performed at a minimum of three publicly accessible sites along the stream reach of interest;
- All sites shall be marked on a 1:24,000 USGS topographic map;
- A photographic record should be prepared for each site that includes upstream and downstream views, in addition to any evidence of observed or potential recreational uses; and
- Interviews of persons present during the time of survey and nearby-residents.

Figure 1. Maline Creek UAA Study Area and Sites



UAA Study Sites

Site #1 - (38.7364, -90.2242)
Site #2 - (38.7348, -90.2231)
Site #3 - (38.7328, -90.2214)
Site #4 - (38.7304, -90.2219)
Site #5 - (38.7286, -90.2204)
Site #6 - (38.7274, -90.2179)

Classified Waters

Maline Creek Recreational UAA Information

- ✓ Watershed Area - 25.1 sq. mi.
- ✓ Intermittent Class C Stream
- ✓ Observed Recreational Uses - None
- ✓ Signs of Potential Human Use
  - Roads
  - Graffiti
  - Foot Path
  - Stormwater Outfall
- ✓ Surrounding Conditions
  - Fence
  - Steep Slopes
  - Urban Areas
  - City Park

In addition to MDNR site characterization requirements, MEC Water Resources, Inc. (MEC) staff collected systematic stream hydrogeometry and riparian corridor information at six evenly spaced sites along classified reaches of Maline Creek (Figure 1). Nearby residents, employees, a Missouri Stream Team #888 representative, and individuals observed near Maline Creek during surveys were interviewed with respect to personal, observed, and anecdotal recreational uses of Maline Creek.

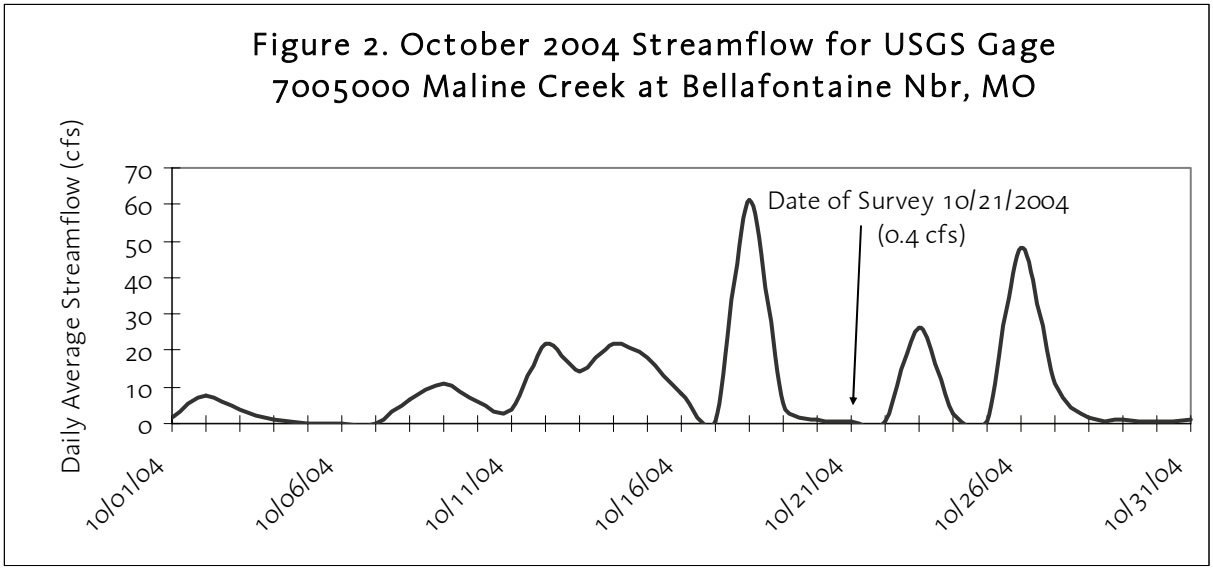
IV. RESULTS AND DISCUSSION

The following discussion is provided to aid decision-makers in evaluating appropriate recreational uses for Maline Creek. Although summarized in the following paragraphs, raw data collected during the survey is contained in Appendix A along with field data sheets required by MDNR UAA protocols (Data Sheets A and B[1]).

A. Environmental Conditions

Six sites within classified sections of Maline Creek (Figure 1) were surveyed on October 21, 2004 using methods referenced and described in Section III. Surveys were conducted during baseflow conditions as evidenced by streamflow data from USGS gage station 07005000 Maline Creek at Bellefontaine Neighbors, MO (Figure 2). Streamflow conditions (0.4 cfs) observed during the survey are representative of baseflow conditions. Reduced infiltration of rainfall in urbanized catchments coupled with a relatively small watershed area (25.1 mi.^{2}) likely limit periods of sustained baseflow. Regulatory classification (Class C) and the absence of upstream continuous discharges confirm that normal flow conditions are similar to those observed during the October 21 assessment.

Field surveys were conducted during the recreational season, as recommended by MDNR protocol. Weather conditions during the survey were stable with a mean daily air temperature of 58°F and mostly cloudy skies. Cooler temperatures may have limited the appeal of recreational activities within Maline Creek to an unknown extent. However, results from interviews are expected to reveal any recreational usage that may not have been directly observed by MEC staff during field surveys.

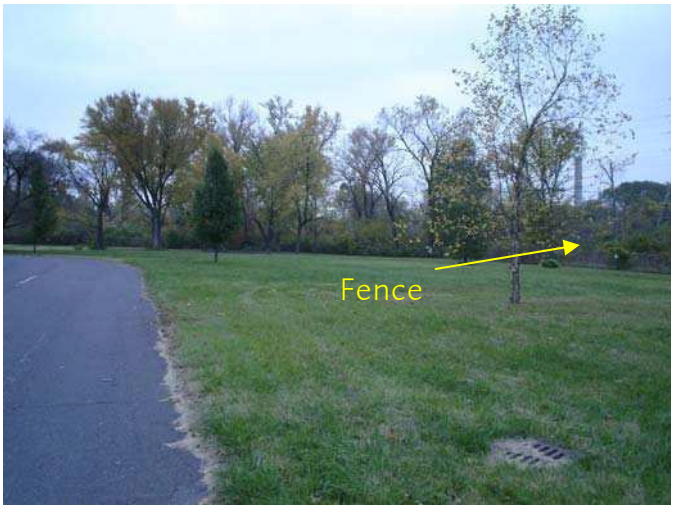


[1] Bacteriological data are presented in Appendix C in a different format than Data Sheet C.

B. Site Characterizations

Six sites along classified reaches of Maline Creek were assessed for existing, potential, and attainable recreational uses. All sites are located within the urban boundaries of Bellefontaine Neighbors, MO and St. Louis, MO. Doherty City Park adjacent to Sites 1 through 4, is bordered by a tall chain link fence that impedes access to Maline Creek (Figure 3).

Figure 3. Doherty City Park



Relatively steep banks, sections of concrete channel, and limited signs of human use characterize recreational use observations at most sites. Each site is described in the following sections to provide reviewers further detail. Lateral Transect depth measurements are provided in Appendix B.

1. Site #1. Maline Creek 5,100 feet Upstream from Mississippi River (38.7364, -90.2242)

Landscapes near Site #1 are essentially urban residential and commercial/industrial. A fence (Figure 4) along one side of the channel, a vertical constructed wall (Figure 5) along another, and a relatively dense riparian corridor nearby may impede recreational use. Banks are relatively steep, composed of concrete block on one side and a constructed wall along another.

Streamflow is transported as a thin sheet across a concrete channel at Site #1. Mean depth along a representative transect was 0.06 ft while the maximum observed depth was 0.1 ft. Waters were observed to be odorless, clear, and free of deposits. The presence of roads were the only signs of potential human use at this site (Table 1).

Figure 4. Maline Creek at Site #1 (Upstream View)

Figure 5. Maline Creek at Site #1 (Downstream View)

Table 1. Site #1 Summary of Recreational Use and Depth Factors

Surrounding Conditions:	Fence, Steep Slopes, Urban Areas, City Park
Observed Uses:	None
Signs of Potential Human Use:	Roads
Channel Substrate:	Concrete Block
Bank Condition:	Steep, Composed of Concrete Block
Water Characteristics:	Clear, Odorless, Deposits Absent
Mean Depth:	0.06 ft.
Maximum Depth:	0.1 ft.

2. Site #2. Maline Creek 4,470 feet Upstream from Mississippi River (38.7348, -90.2231)

A fence adjacent to a dense riparian corridor and constructed vertical wall along the channel may impede recreational use at Site #2 (Figures 6 and 7). Banks are steep and composed of a mud/cobble mixture on the left descending bank and a vertical constructed wall on the right descending bank.

Figure 6. Maline Creek at Site #2 (Upstream View)

Figure 7. Maline Creek at Site #2 (Downstream View)

A control structure located near Site #4, promotes moderate ponding and backwater effects at Site #2. Channel substrate is 80% fine sediment and 20% cobble. Mean depth along a representative transect was 1.1 ft while the maximum observed depth was 1.9 ft. Waters were observed to be odorless, slightly brown in color, and free of deposits. Signs of potential human use were not observed at this site (Table 2).

Table 2. Site #2 Summary of Recreational Use and Depth Factors

Surrounding Conditions:	Fence, Steep Slopes, Urban Area
Observed Uses:	None
Signs of Potential Human Use:	None
Channel Substrate:	80% Mud/clay, 20% cobble
Bank Condition:	Steep, Vertical Wall
Water Characteristics:	Brown Color, Odorless, Deposits Absent
Mean Depth:	1.1 ft.
Maximum Depth:	1.9 ft.

3. Site #3. Maline Creek 3,570 feet Upstream from Mississippi River (38.7328, -90.2214)

A fence adjacent to a dense riparian corridor and constructed vertical wall along the channel may impede recreational use at Site #3 (Figures 8 and 9). Banks are steep and composed of a mud/cobble mixture on the left descending bank and a vertical constructed wall on the right descending bank.

Figure 8. Maline Creek at Site #3 (Upstream View)

Figure 9. Maline Creek at Site #3 (Downstream View)

Site #3 is a shallow pool resultant from a control structure located near Site #4. Channel substrate is 60% cobble, 20% mud/clay, 10% gravel, and 10% silt. Mean depth along a representative transect was 1.5 ft while the maximum observed depth was 2.3 ft. Waters were observed to be odorless, slightly brown in color, and free of deposits. Signs of potential human use were not observed at this site (Table 3).

Table 3. Site #3 Summary of Recreational Use and Depth Factors

Surrounding Conditions:	Fence, Steep Slopes, City Parks
Observed Uses:	None
Signs of Potential of Human Use:	None
Channel Substrate:	60% Cobble, 20% Mud/Clay, 10% Silt, 10% Gravel
Bank Condition:	Steep, Vertical Wall
Water Characteristics:	Brown Color, Odorless, Deposits Absent
Mean Depth:	1.5 ft.
Maximum Depth:	2.3 ft.

4. Site #4. Maline Creek 2,640 feet Upstream from Mississippi River (38.7304, -90.2219)

Although stream access is limited, graffiti along a small section of concrete streambank (Figures 10 and 11) suggests that fences and vertical containment walls at the site may not prevent determined access to the site.

Figure 10. Maline Creek at Site #4 (Upstream View)

Figure 11. Maline Creek at Site #4 (Downstream View)

Streamflow is slowed by a control structure (Figure 12) just downstream of Site #4, which likely represents the deepest section of Maline Creek. Mean depth across a representative transect was 2.1 ft. while the maximum observed depth was 4.3 ft. Channel substrate is mostly cobble upstream of the control structure and concrete-lined below.

Figure 12. Maline Creek Control Structure near Site #4

Waters were observed to be odorless, slightly brown in color, and free of deposits (Table 4). Signs of potential human use were limited to graffiti located on a concrete embankment upstream of the control structure.

Table 4. Site #4 Summary of Recreational Use and Depth Factors

Surrounding Conditions:	Fence, Steep Slopes, City Parks, Urban Areas
Observed Uses:	None
Signs of Potential Human Use:	Graffiti
Channel Substrate:	70% Cobble, 20% Silt, 10% Gravel
Bank Condition:	Steep, Vertical Wall
Water Characteristics:	Brown Color, Odorless, Deposits Absent
Mean Depth:	2.1 ft.
Maximum Depth:	4.3 ft.

5. Site #5. Maline Creek 1,800 feet Upstream from Mississippi River (38.7286, -90.2204)

Upstream of Site #5, the Maline Creek stream channel features steep concrete embankments and a sparse riparian corridor (Figure 13). Downstream, the stream transitions to a less disturbed state having natural substrates and more defined riparian areas (Figure 14).

Figure 13. Maline Creek at Site#5. (Upstream View)

Figure 14. Maline Creek at Site #5 (Downstream View)

Streamflow travels first as a thin sheet across a concrete channel then drops into a small scour pool downstream. Mean depth measured 0.1 ft while the maximum observed depth was 0.3 ft. Estimates were not obtained in the scour pool as the majority of the reach is lined with concrete. Waters were observed to be odorless, clear, free of deposits, and having limited growths of benthic algae (Table 5). Signs of potential human use were limited to graffiti and foot paths near a stormwater outfall.

Table 5. Site #5 Summary of Recreational Use and Depth Factors

Surrounding Conditions:	Fence, Steep Slopes, Urban Areas
Observed Uses:	None
Signs of Potential Human Use:	Grafitti, Foot Path, Stormwater Outfall
Channel Substrate:	Concrete Upstream, Cobble/Mud Mixture Downstream
Bank Condition:	Concrete Upstream, Cobble/Mud Mixture Downstream
Water Characteristics:	Colorless, Odorless, Deposits Absent, Benthic Algae
Mean Depth:	0.1 ft.
Maximum Depth:	0.3 ft.

6. Site #6. Maline Creek 930 feet Upstream from Mississippi River (38.7274, -90.2179)

Site #6 features steep cobble-strewn banks with a fence along the floodplain and a concrete lined channel (Figures 15 and 16). The riparian corridor is a thick mix of forbs and young trees. Manmade alterations to the stream channel terminate at a vertical drop approximately 300 feet upstream from the Mississippi River (Figure 17).

Figure 15. Maline Creek at Site#6. (Upstream View)

Figure 16. Maline Creek at Site #6 (Downstream View)

Streamflow is contained within a concrete channel as sheet flow. Mean depth measured 0.2 ft while the maximum observed depth was 0.8 ft. Waters were observed to be odorless, clear, free of deposits, and having limited growths of benthic algae (Table 6). Signs of potential human use were limited to graffiti near a bridge crossing. A CSO outfall is present within this reach.

Figure 17. View of the Mississippi River Confluence

Table 6. Site #6 Summary of Recreational Use and Depth Factors

Surrounding Conditions:	Fence, Steep Slopes
Observed Uses:	None
Signs of Potential Human Use:	Graffiti, CSO Outfall
Channel Substrate:	Mostly Concrete
Bank Condition:	Concrete/Cobble Mix
Water Characteristics:	Colorless, Odorless, Deposits Absent, Benthic Algae
Mean Depth:	0.2 ft.
Maximum Depth:	0.8 ft.

C. Recreational Use Interviews

A representative of Missouri Stream Team #888 and six nearby residents, employees, or passers-by were interviewed by MEC staff as part of recreational use surveys (Appendix D). Questions asked of each interviewee include but are not limited to:

- Have you or your family used Maline Creek for recreational purposes?
- Have you personally observed another party using Maline Creek for recreational purposes?
- Have you heard of any party using Maline Creek for recreational purposes?

All interviewees responded that they had not directly used, observed use by another party, or heard of anyone using classified reaches of Maline Creek for whole body contact recreational purposes. Two individuals mentioned they had seen maintenance crews and teenagers on the top of the streambanks, but not within Maline Creek. Stream Team #888 indicated that several years ago there was a swimming hole in Maline Creek near Florissant Road; however, this location is several miles upstream of the classified study segment. Other than this anecdotal statement, this individual has never personally used it, observed it being used, or heard of anyone using it for such purposes.

V. WHOLE BODY CONTACT RECREATION USE CONSIDERATIONS

A designated use may only be downgraded or removed if this use is not an existing use and is considered unattainable. Therefore, the UAA process must include consideration of both existing uses and attainability of potential uses. The following sections include existing use and use attainability considerations that provide the basis for the WBCR use recommendations.

A. Existing Use Considerations

Provisions contained within the CWA prohibit removal of an existing use that was attained on or after November 28, 1975. Use attainment is measured by assessing compliance with applicable water quality standards (beneficial uses and water quality criteria). In the case of recreational contact uses (swimming, etc.), existing use considerations should be based upon attainment of both:

- The Beneficial Use, i.e. historic use of the waterbody in question for swimming, water skiing, skin diving, etc.; and
- The Water Quality Criteria that support the beneficial use, i.e. historical (after 11/28/75) and current levels of pathogen indicator bacteria.

In summary, a recreational use should be considered attained and existing when the waterbody is used for a specified recreational activity and is concurrently supported by levels of water quality adequate for the specific use.

1. Beneficial Use Evaluation

It is concluded that surveyed reaches of Maline Creek are not currently being used for WBCR activities based on:

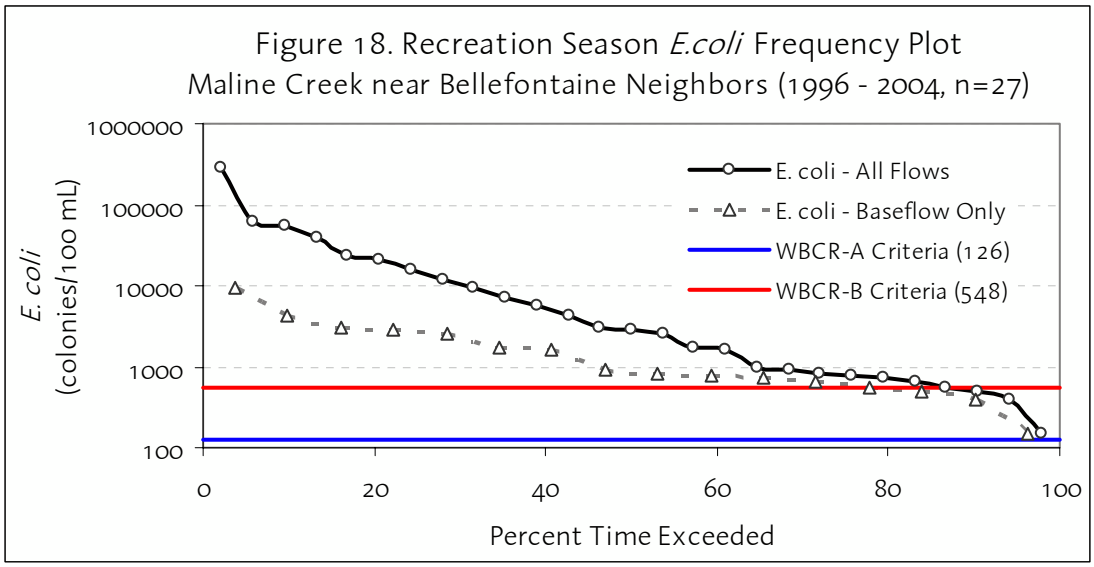
- Absence of observed use by MEC staff;
- Absence of observed use by local citizenry; and
- Absence of substantive evidence such as rope swings, docks, diving platforms, etc.

In addition, interviews with local citizenry did not yield any witnessed or anecdotal evidence of historical WBCR use. Steep banks, vertical containment walls, private property boundaries, and fencing along the stream channel limit potential use by restricting access to the general public. Therefore, WBCR is not an existing use within surveyed reaches of Maline Creek based on the absence of historical (since 1975) or current evidence of the use.

2. Water Quality Criteria Evaluation

MDNR is proposing a tiered approach to recreational use classification. The proposed Category A of WBCR (WBCR-A) will include waters that have been established as public swimming areas allowing full and free access by the public for swimming purposes and waters with existing whole body contact recreational use. MDNR currently proposes this WBCR use category for waters that are currently designated for WBCR in Missouri's Water Quality Standards. Water quality criteria assigned to the proposed WBCR-A use are fecal coliform and *E. coli* geometric means of 200 and126 colonies per 100 mL, respectively. These criteria are based upon an illness risk of 8 illnesses per 1000 WBCR exposures. Proposed category B of WBCR (WBCR-B) contains all other waters designated for WBCR not contained within Category A. The proposed Missouri Water Quality Standards regulations include WBCR-B use designation of Maline Creek. The water quality criterion assigned to WBCR-B is an *E. coli* geometric mean of 548 colonies /100 mL, based upon an illness risk of 14 illnesses per 1000 WBCR exposures.

A frequency plot of recreation season bacteria data collected by the U.S. Geologic Survey in Maline Creek from 1996 through 2004 (Appendix C) indicate that the proposed *E. coli* WBCR-A criterion was not met during the eight year period of record, even during baseflow conditions (Figure 18). In addition, the proposed *E. coli* WBCR-B criterion was exceeded within 86% of collected samples (Figure 18). Recreation season geometric means listed by year and flow condition indicate that neither the proposed WBCR-A or WBCR-B *E. coli* criteria were met (Table 7). The existing fecal coliform WBCR-A criterion has not been met near Bellafontaine Neighbors during the eight year period (Figure 19, Table 8). Therefore, available data indicate that Maline Creek water quality does not meet levels required to support WBCR uses during the recreation season.



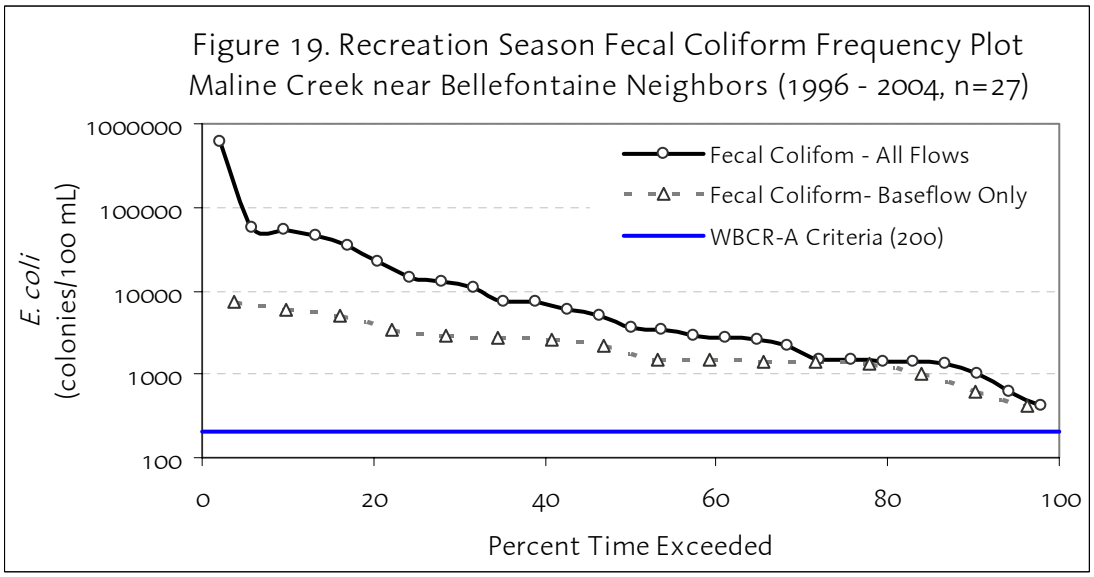


Table 7. Annual Recreation Season *E. coli* Concentrations in Maline Creek

All Flows			Baseflow Only		
Year (YYYY)	Sample # (#)	Geomean* (col./100 mL)	Year (YYYY)	Sample # (#)	Geomean* (col./100 mL)
1996	2	12,514	1996	1	2,900
1997	4	3,914	1997	2	1,978
1998	2	8,246	1998	1	1,700
1999	3	2,150	1999	2	657
2000	3	1,548	2000	2	800
2001	4	8,176	2001	2	1,510
2002	3	3,079	2002	2	1,351
2003	4	2966	2003	2	554
2004	2	1,187	2004	2	1,187
1996 - 2004	27	3,630	1996 - 2004	16	1,152

*Geomeans based on less than 5 samples during steady-state conditions may not appropriately characterize central tendencies.

Table 8. Annual Recreation Season Fecal Coliform Concentrations in Maline Creek

All Flows			Baseflow Only		
Year (YYYY)	Sample # (#)	Geomean* (col./100 mL)	Year (YYYY)	Sample # (#)	Geomean* (col./100 mL)
1996	2	13,921	1996	1	3,400
1997	4	4,344	1997	2	1,466
1998	2	11,849	1998	1	2,600
1999	3	3,074	1999	2	924
2000	3	4,017	2000	2	3,000
2001	4	12,903	2001	2	2,049
2002	3	4,361	2002	2	2,526
2003	4	4866	2003	2	1349
2004	2	2,683	2004	2	2,683
1996 - 2004	27	5,613	1996 - 2004	16	1,970

*Geomeans based on less than 5 samples during steady-state conditions may not appropriately characterize central tendencies.

3. Existing Use Conclusions

Information and data collected during this study confirm that WBCR is not an *existing use* that has been *attained* in surveyed sections of Maline Creek. This existing use conclusion is based upon the absence of current or historical (post-11/28/75) evidence of WBCR use and *E. coli* and fecal coliform levels that exceed proposed water quality criteria that support the use.

B. Attainability of Whole Body Contact Recreational Use

The CWA precludes the removal of existing or attainable uses. As presented above, WBCR use within the surveyed reaches of Maline Creek is not an existing use. For WBCR to be considered unattainable, one or more of six conditions described in 40 CFR 131.10(g) and MNDR UAA protocols must be satisfied. Multiple use attainability factors outlined in Federal regulations may apply to Maline Creek, including use attainment prevented by natural concentrations of pollutants (Factor 1), low flow, shallow conditions (Factor 2), non-remedial human caused conditions (Factor 3), hydrologic modifications (Factor 4) and substantial and widespread economic and social impacts (Factor 6).

1. Natural Concentrations of Bacteria Prevent Use Attainment

Bacteria in urban stormwater runoff and baseflow originate from numerous sources. Bacterial source tracking studies completed in Blue River and Brush Creek, located within Kansas City, MO, yielded an even distribution between dogs (28.3%), geese (22.1%), humans (23.4%), and unknown sources (26.2%) (Wilkison et al. 2002). Nationally, an intensive effort in San Diego's Mission Bay determined 67% of pathogenic bacteria originated from avian sources, 9% from dogs, and only 5% from humans (Gruber et. al 2005). MSD has contracted with the U.S. Geologic Survey to conduct a bacterial source tracking study to characterize pathogen levels caused by natural and human sources. Results from the study may determine if natural bacteria alone could prevent WBCR use attainment.

2. Natural, Ephemeral, Intermittent, or Low Flow Conditions Prevent Use Attainment

MDNR has determined that natural, ephemeral, intermittent, or low flow conditions prevent WBCR uses if:

- the average depth of the waterbody is less than 1.64 feet over 50% of all the water surveyed from an observation point; or
- the maximum depth less than 3.28 feet.

WBCR use is considered unattainable due to low flow and shallow conditions that are prevalent over the majority of the stream segment. Due to a stormwater control structure, one of six evaluated transects within classified reaches of Maline Creek exhibited an average depth greater than 1.64 feet and a maximum depth greater than 3.28 feet (Table 8). This location is not considered representative of Maline Creek and is relatively isolated, reducing the potential for WBCR use. Evidence of WBCR use was absent at this site and the only sign of human presence was graffiti on a concrete embankment.

Table 9. Maline Creek Transect Depth Summary

Transect (#)	Mean Depth (ft.)	Maximum Depth (ft.)
Site #1	0.06	0.1
Site #2	1.13	1.9
Site #3	1.53	2.34
Site #4	2.10	4.3
Site #5	0.14	0.28
Site #6	0.19	0.75
Classified Reach	0.9	4.3

3. Non-Remedial Human Caused Conditions Prevent Use Attainment

There are no permitted continuous discharges in the Maline Creek watershed, yet proposed WBCR-B criteria are exceeded 90% of the time during baseflow conditions (see Section 5.A.2.). Influences from potential diffuse bacteria sources are not presently quantified in the watershed. However, landuse practices have remained essentially unchanged since 1975 based upon comparison of U.S. Geologic Survey Granite City Quadrangle maps generated in 1974 and 1998. This observation suggests that urban stormwater water quality has not significantly changed since 1975.

Attainment of WBCR uses may be challenging for many urban waters. Median bacteria concentrations (fecal coliform - 5,081 colonies/100mL, *E. coli* – 1,750 colonies/100 mL) collected from urban stormwater as part of the EPA National Pollutant Discharge Elimination System (NPDES) Phase 1 stormwater program exceed WBCR-A and WBCR-B criteria (Pitt et al. 2003). As the quality of urban runoff is often associated with land use, any significant changes to land use composition required to meet WBCR criteria may represent a non-remedial condition that prevents the use from being attained.

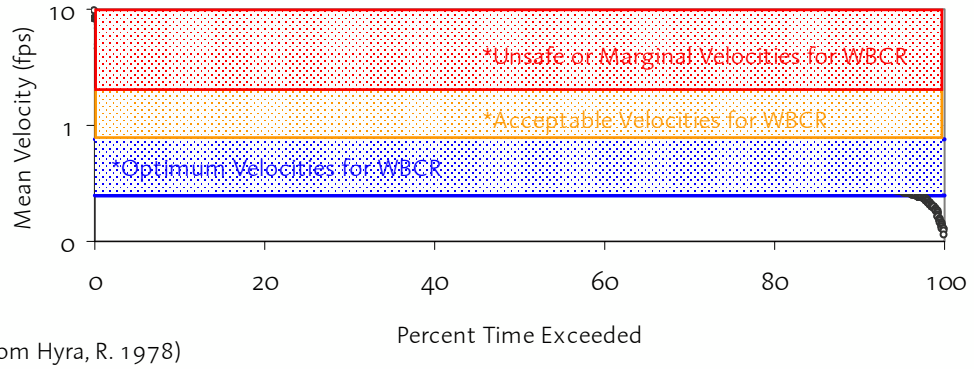
4. Hydrologic Modifications Prevent Use Attainment

The channelization of Maline Creek and development of its watershed represent hydrologic modifications. Much of Maline Creek is channelized and lined with concrete. Coupled with increased runoff volumes and peak flows from impervious areas, channelized streams exhibit increased stream velocities for a given flow rate. A frequency plot (Figure 19) of mean velocities for flows recorded at the Bellafontaine gage was developed from the velocity-flow rating curve (Figure 20). According to Hyra (1978), optimal water velocities for swimming range from 0.25 to 0.75 feet per second (fps) while those exceeding 2 fps are considered marginal and unsafe at greater than 3 fps. Marginal swimming conditions based on velocity boundaries are exceeded approximately 6% of the time at the Bellefontaine gage and correspond to flows above approximately 100 cubic feet per second. However, shear forces and extraction challenges resultant from vertical containment walls and concrete embankments may present safety risks at velocities less than 2 fps. Further investigation into runoff and velocity regimes in the study area would allow identification of velocity hazards.

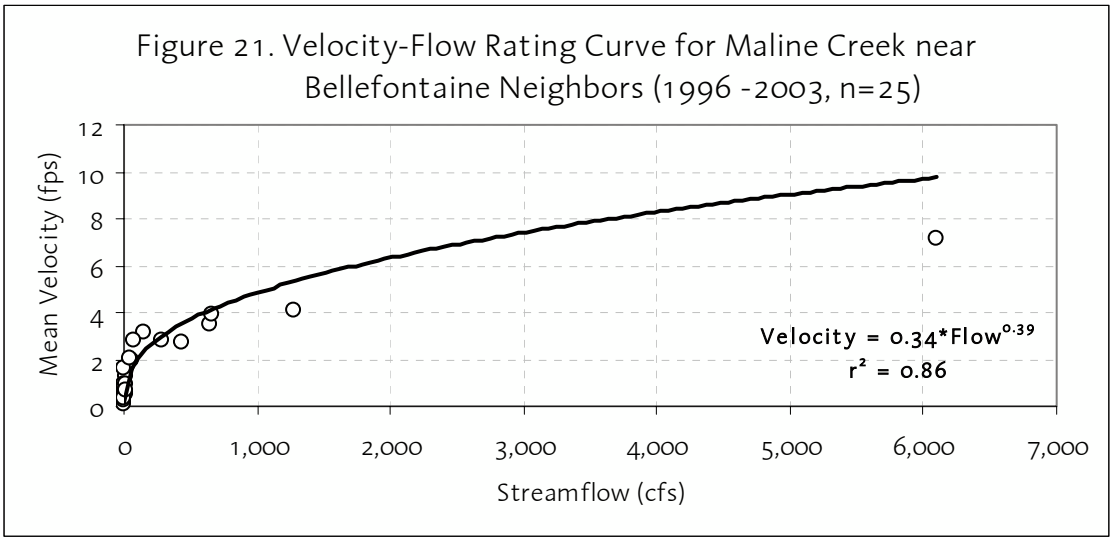
Water depths supporting WBCR at the Bellefontaine gage are apparently reached at flows that induce marginal or unsafe swimming velocities due to hydrologic modifications. Mean depth thresholds ($\geq$1.64 feet) set forth in MDNR UAA protocols correspond to flows near 230 cfs according to the depth-flow rating curve developed for the Bellefontaine gage (Figure 21). However, the extent to which channel characteristics at the Bellefontaine gage are applicable to ungaged sites within the study reach is uncertain. Mean depth of surveyed reaches (0.9 ft) measured during October surveys at 0.4 cfs is larger than mean depths predicted at 0.4 cfs by the Bellefontaine depth-flow rating curve (0.15 ft.).

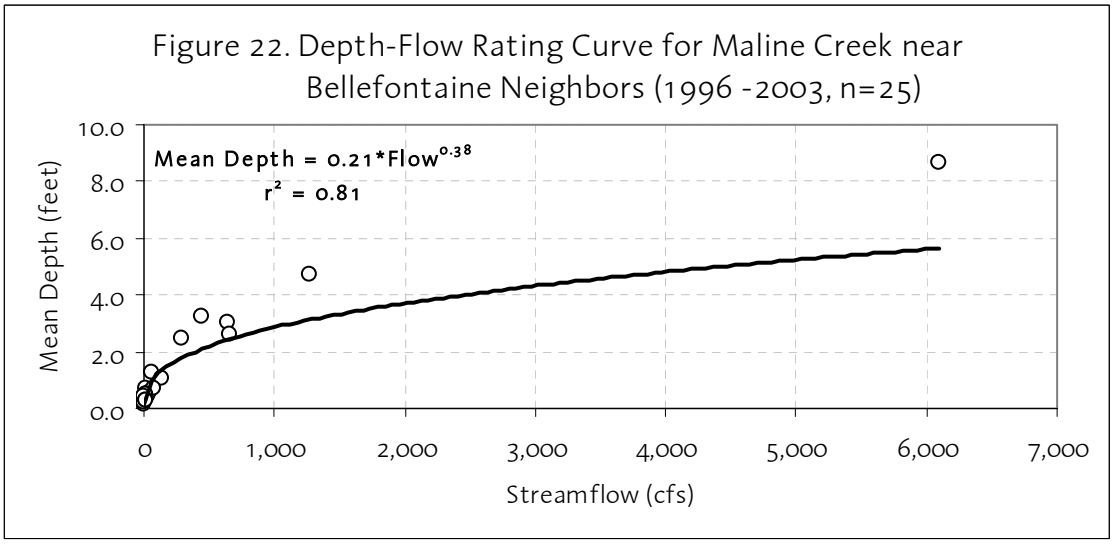
This analysis demonstrates that WBCR uses may be unattainable due to hydrologic modifications that result in high velocities during some periods of stormwater runoff.

Figure 20. Synthetic Mean Velocity Frequency Plot Maline Creek near Bellefontaine Neighbors (1978 - 2004)



*(from Hyra, R. 1978)





5. Substantial and Widespread Social and Economic Impact Prevent Use Attainment

MSD is in the process of developing a CSO Long Term Control Plan (LTCP). As part of the LTCP, the economic impacts of different CSO control options will be evaluated. The public participation process will also aid in determination the level of control and financial impact desired by the community. Other cities, such as Boston, Portland, and Milwaukee, have found that support of swimming uses in urban streams are not economically feasible.

VI. CONCLUSIONS

As currently delineated, the classified section of Maline Creek does not host existing WBCR uses due to the absence of observed or historical WBCR use and water quality that does not support swimming related activities. Therefore, WBCR is not an existing use.

WBCR is considered unattainable due to low flow and shallow conditions prevalent within the stream. Low-flow, shallow conditions were observed at five of six survey sites. Although maximum depth criteria were exceeded at Site #4, this stream segment is not representative of the entire classified segment and use of the site for swimming is unlikely due to the isolated and inaccessible nature of the area.

In addition to low-flow, shallow conditions preventing WBCR use attainability, several other use attainability factors may demonstrate that WBCR use is unattainable. Additional information is needed to determine if natural pollutant levels, non-remedial conditions, hydrologic modifications, or widespread economic impacts support removing WBCR as a use for Maline Creek.

VII. REFERENCES

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Hyra, R. 1978. Methods for Assessing Instream Flows for Recreation. Cooperative Instream Flow Service Group, Fort Collins, CO.

Missouri Department of Natural Resources. 2004. Recreational Use Attainability Analysis Protocol. Water Protection Program, Jefferson City, MO.

Pitt, R., A. Maestre, and R. Morquecho. 2003. The National Stormwater Quality Database. Department of Civil and Environmental Engineering. University of Alabama. Tuscaloosa.

St. Louis Municipalities Phase II Stormwater Planning Committee (SSPC). 2002. "St. Louis County Phase II Storm Water Management Plan"

Wilkison, D., D. Armstrong, and D. Blevins. 2002. Effects of Wastewater and Combined Sewer Overflows on Water Quality in the Blue River Basin, Kansas City, Missouri and Kansas, July 1998-October 2000. Water-Resources Investigations Report 02-4107. U.S. Geological Survey, Rolla, MO.

Appendix A.

MDNR Recreational Use Stream Survey Forms
(Data Sheets A and B)

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet A – Water Body Identification

Water Body Name: Maline Creek (from USGS 7.5' quad)
8-digit HUC: 07140101
Missouri WBID # 1709
County: St. Louis and St. Louis City
Upstream Legal Description: N/A French Survey
Downstream Legal Description: N/A French Survey
Upstream Coordinates: 38.73627, -90.22436 (USG 84, dd,dddd)
Downstream Coordinates: 38.72709, -90.21509 (USG 84, dd.dddd)
Discharger Facility Name(s): N/A
Discharger Permit Number(s): N/A
Number of Sites Evaluated: Six (6)
Name of Surveyor and Telephone Number: Trent Stober (573) 443-4100
Organization: MEC Water Resources, Inc.
Position: Senior Project Manager

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: _____ **Date:** 7/7/05

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBID #: 1709	Site Location Description: (0741276/4291179) M. Cr. - 1
Site Lat/Long: #173	
Date & Time: 10/21/04 0830	Facility Name:
Personnel: NM/CL	Permit Number:
Current Weather Conditions: Cloudy	Weather Conditions for Past 7 days:
Photo Ids: Upstream:	Downstream: Other:

pics #s

Used Observed*:

☐ Swimming	☐ Skin Diving	☐ SCUBA diving	☐ Tubing	☐ Water Skiing
☐ Wind surfing	☐ Kayaking	☐ Boating	☐ Wading	☐ Rafting
☐ Hunting	☐ Trapping	☐ Fishing	☒ None of the above	☐ Other
Describe: (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.				

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

☐ City/county parks	☐ Playgrounds	☐ MDC conservation lands	☒ Urban areas	☐ Campgrounds
☐ Boating accesses	☐ State parks	☐ National forests	☐ Nature trails	☐ Stairs/walkway
☐ No trespass sign	☒ Fence	☒ Steep slopes	☐ Other:	

Evidence of Human Use*:

☒ Roads	☐ Foot paths/prints	☐ Dock/platform	☐ Livestock Watering	☐ RV/ATV Tracks
☐ Rope swings	☐ Camping Sites	☐ Fire pit/ring	☐ NPDES Discharge	☐ Fishing Tackle
☐ Other:				

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular recreational use analysis but may point to conditions that need further analysis or that effect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

☒ Riffle	Width(ft)	35	Length(ft)	350	Ave. Depth(ft)	0.1	Max. Depth(ft) 0.25
☐ Run	Width(ft)		Length(ft)		Ave. Depth(ft)		Max. Depth(ft)
☐ Pool	Width(ft)		Length(ft)		Ave. Depth(ft)		Max. Depth(ft)
☒ Flow	Present?	(Yes)	No		Estimated (ft³/sec):	2	

Downstream View Physical Dimensions:

☒ Riffle	Width(ft)	35	Length(ft)	75	Ave. Depth(ft)	0.1	Max. Depth(ft) 0.25
☐ Run	Width(ft)		Length(ft)		Ave. Depth(ft)		Max. Depth(ft)
☒ Pool	Width(ft)	30	Length(ft)	>200	Ave. Depth(ft)	1.5	Max. Depth(ft) 2.3
☒ Flow	Present?	(Yes)	No		Estimated (ft³/sec):	2	

Substrate*: (These values should add up to 100%)

%Cobble	%Gravel	%Sand	%Silt	%Mud/Clay	100 %~~Bedrock~~ Concrete Block

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Water Characteristics*: (Mark all that apply.)

Odor:	☐ Sewage	☐ Musky	☐ Chemical	☒ None	☐ Other
Color:	☒ Clear	☐ Green	☐ Gray	☐ Milky	☐ Other
Bottom Deposit:	☐ Sludge	☐ Solids	☐ Fine sediments	☒ None	☐ Other
Surface Deposit:	☐ Oil	☐ Scum	☐ Foam	☒ None	☐ Other

Comments: Please attach additional comments (including information from interviews) to this form.

*This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that effect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: Connie Luehlers Date: 10/21/04

Organization: MEC Water Resources Position: Environmental Specialist

MEC Water Resources

Stream Morphology & Discharge Measurements

Project Name/Number: MSD UAA

Date/Time: 10/21/04

Site/Transect ID Number: M.Co. - 1

Start Time: 8:30 End Time: 9:05

Measured by: NM/CL Air Temp: 55°F Weather Cond: Cloudy

Stream Morphology Between Transects

	Length of Pools			Length of Run			Length of Riffles		
#	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

From LDB

Stream Morphology At Transect

LDB Angle: 38%/21° RDB Angle: 18%/10° @ 40' Secchi (ft) _____ Turbidity (NTU): _____

Channel Comp (%): Cobble _____ Gravel _____ Sand _____ Silt _____

Other Concrete block - 100

Bank Compostion Concrete block

Riparian Corridor Density: Width of Riparian Area: 0

Compostion of Riparian Vegitation: —

General Observations: Chain link fence on RDB & Guard rail/road on LDB

Stream Discharge Measurements

Beginning Stage _____ Ending Stage: _____ Total Q: _____

Channel Width: _____ Total Area: _____ Average Velocity: _____

Distance from Datum to Water Surface: Start: End:

Meas. type: Price AA Pygmy Data Coll. Type: Aqua Calc Sheet Aqua Calc Transect #:

Stream Discharge Measurements

Time	Station #	Angle Coefficient	Distance (from initial Point-ft.)	Width	Depth (ft.)	Observation Depth	Revs.	Interval Time - In seconds	Velocity (f/s)		Adjusted for Hor. Angle	Section Area ($ft.^2$)	Section Discharge (cfs)
									At Point	Mean in Vertical			
	1 (EOW)		0			0	0	0	0	0			
			1.5		0								
			2		.1								
			7		.1								
			12		.06								
			17		.03								
			22		.04								
			27		.05								
			32		.1								
			34		.05								
			35		0								
			40		0								

Log Sheet Totals:

Sheet Calculated Discharge:

Aqua Calc Discharge:

Remarks:

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBID #: 1709	Site Location Description: M.Cr.-2 (0741364 / 4291013)
Site Lat/Long: 176	
Date & Time: 10/21/04 9:10	Facility Name:
Personnel: NM/CC	Permit Number:
Current Weather Conditions: Cloudy	Weather Conditions for Past 7 days: Cloudy
Photo Ids: Upstream:	Downstream: Other:

pic #s -

Used Observed*:

☐ Swimming	☐ Skin Diving	☐ SCUBA diving	☐ Tubing	☐ Water Skiing
☐ Wind surfing	☐ Kayaking	☐ Boating	☐ Wading	☐ Rafting
☐ Hunting	☐ Trapping	☐ Fishing	☒ None of the above	☐ Other

Describe: (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

☐ City/county parks	☐ Playgrounds	☐ MDC conservation lands	☒ Urban areas	☐ Campgrounds
☐ Boating accesses	☐ State parks	☐ National forests	☐ Nature trails	☐ Stairs/walkway
☐ No trespass sign	☒ Fence	☒ Steep slopes	☐ Other:	

Evidence of Human Use*:

☐ Roads	☐ Foot paths/prints	☐ Dock/platform	☐ Livestock Watering	☐ RV/ATV Tracks
☐ Rope swings	☐ Camping Sites	☐ Fire pit/ring	☐ NPDES Discharge	☐ Fishing Tackle
☐ Other:				

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular recreational use analysis but may point to conditions that need further analysis or that effect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

☒ Riffle	Width(ft)	30"/5	Length(ft)	100	Ave. Depth(ft)	0.3	Max. Depth(ft) 0.4
☐ Run	Width(ft)		Length(ft)		Ave. Depth(ft)		Max. Depth(ft)
☒ Pool	Width(ft)	40	Length(ft)	200	Ave. Depth(ft)	1.5	Max. Depth(ft) 2.3
☒ Flow	Present?	(Yes)	No		Estimated (ft³/sec):	2	

Downstream View Physical Dimensions:

☐ Riffle	Width(ft)		Length(ft)		Ave. Depth(ft)		Max. Depth(ft)
☐ Run	Width(ft)		Length(ft)		Ave. Depth(ft)		Max. Depth(ft)
☒ Pool	Width(ft)	45	Length(ft)	>500	Ave. Depth(ft)	2.0	Max. Depth(ft) 2.4
☒ Flow	Present?	(Yes)	No		Estimated (ft³/sec):	2	

Substrate*: (These values should add up to 100%)

20 %Cobble	%Gravel	%Sand	%Silt	80 %Mud/Clay	%Bedrock

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Water Characteristics*: (Mark all that apply.)

Odor:	☐ Sewage	☐ Musky	☐ Chemical	☒ None	☐ Other
Color:	☐ Clear	☐ Green	☐ Gray	☐ Milky	☒ Other Brown
Bottom Deposit:	☐ Sludge	☐ Solids	☐ Fine sediments	☒ None	☐ Other
Surface Deposit:	☐ Oil	☐ Scum	☐ Foam	☒ None	☐ Other

Comments: Please attach additional comments (including information from interviews) to this form.

*This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that effect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: Cassidy Lochhead Date: 10/21/04

Organization: MEC Water Resources Position: Environmental Specialist

MEC Water Resources

Stream Morphology & Discharge Measurements

Project Name/Number: MSD WAA

Date/Time: 10/21/04 9:10

Site/Transect ID Number: M. Cr. - 2

Start Time: 9:10 End Time: 9:20

Measured by: NM/CL Air Temp: 55°F Weather Cond: Cloudy

Stream Morphology Between Transects

	Length of Pools			Length of Run			Length of Riffles		
#	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #
1								174	175
2		175							
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Stream Morphology At Transect

From LDB

LDB Angle: >150%/57.5° RDB Angle: 18%/10° @53' Secchi (ft) _____ Turbidity (NTU): _____

Channel Comp (%): Cobble 20 Gravel _____ Sand _____ Silt _____

Other Mud/Clay - 80

Bank Compostion LDB - Concrete wall, RDB - Mud & Rock

Riparian Corridor Density: Width of Riparian Area: LDB - 0, RDB - 30

Compostion of Riparian Vegitation: RDB - Trees, shrubs, forbs, grass

General Observations: _____

Stream Discharge Measurements

Beginning Stage _____ Ending Stage: _____ Total Q: _____

Channel Width: _____ Total Area: _____ Average Velocity: _____

Distance from Datum to Water Surface: Start: End:

Meas. type: Price AA Pygmy Data Coll. Type: Aqua Calc Sheet Aqua Calc Transect #:

Stream Discharge Measurements

Time	Station #	Angle Coefficient	Distance (from Initial Point-ft.)	Width	Depth (ft.)	Observation Depth	Revs.	Interval Time - in seconds	Velocity (f/s)		Adjusted for Hor. Angle	Section Area ($ft.^2$)	Section Discharge (cfs)
									At Point	Mean in Vertical			
	1 (EOW)		0			0	0	0	0	0			
			1		0.4								
			3		1.15								
			7		1.30								
			12		1.82								
			17		1.90								
			22		1.90								
			27		1.40								
			32		0.70								
			37		0.8								
			42		0.7								
			47		0.5								
			52		0.4								
			53		0								

Log Sheet Totals:

Sheet Calculated Discharge:

Aqua Calc Discharge:

Remarks:

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBID #: 1709	Site Location Description: M.Co. - 3 (0741515 / 4290788)
Site Lat/Long: 177	
Date & Time: 10/21/04 09:25	Facility Name:
Personnel: NM/CL	Permit Number:
Current Weather Conditions: Cloudy	Weather Conditions for Past 7 days: Cloudy
Photo Ids: Upstream:	Downstream: Other:

pic. #s - 0075-0078

Used Observed*:

☐ Swimming	☐ Skin Diving	☐ SCUBA diving	☐ Tubing	☐ Water Skiing
☐ Wind surfing	☐ Kayaking	☐ Boating	☐ Wading	☐ Rafting
☐ Hunting	☐ Trapping	☐ Fishing	☒ None of the above	☐ Other
Describe: (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.				

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

☒ City/county parks	☐ Playgrounds	☐ MDC conservation lands	☐ Urban areas	☐ Campgrounds
☐ Boating accesses	☐ State parks	☐ National forests	☐ Nature trails	☐ Stairs/walkway
☐ No trespass sign	☒ Fence	☒ Steep slopes	☐ Other:	

Evidence of Human Use*:

☐ Roads	☐ Foot paths/prints	☐ Dock/platform	☐ Livestock Watering	☐ RV/ATV Tracks
☐ Rope swings	☐ Camping Sites	☐ Fire pit/ring	☐ NPDES Discharge	☐ Fishing Tackle
☐ Other:				

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular recreational use analysis but may point to conditions that need further analysis or that effect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

☐ Riffle	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 40	Length(ft) >500	Ave. Depth(ft) 2.0	Max. Depth(ft) 2.8
☒ Flow	Present? (Yes)	No	Estimated (ft³/sec): 2	

Downstream View Physical Dimensions:

☐ Riffle	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 45	Length(ft) 800	Ave. Depth(ft) 2.4	Max. Depth(ft) 4.0
☒ Flow	Present? (Yes)	No	Estimated (ft³/sec): 2	

Substrate*: (These values should add up to 100%)

60 %Cobble	10 %Gravel	%Sand	10 %Silt	20 %Mud/Clay	%Bedrock

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Water Characteristics*: (Mark all that apply.)

Odor:	☐ Sewage	☐ Musky	☐ Chemical	☒ None	☐ Other
Color:	☐ Clear	☐ Green	☐ Gray	☐ Milky	☒ Other Brown
Bottom Deposit:	☐ Sludge	☐ Solids	☐ Fine sediments	☒ None	☐ Other
Surface Deposit:	☐ Oil	☐ Scum	☐ Foam	☒ None	☐ Other

Comments: Please attach additional comments (including information from interviews) to this form.

*This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that effect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: Casey Luchsinger Date: 10/21/04

Organization: MEC Water Resources Position: Environmental Specialist

MEC Water Resources

Stream Morphology & Discharge Measurements

Project Name/Number: MSD UAA

Date/Time: 10/21/04 9:25

Site/Transect ID Number: M.Cr. - 3

Start Time: 9:25 End Time: 9:40

Measured by: NM/CL Air Temp: 55°F Weather Cond: Cloudy

Stream Morphology Between Transects

	Length of Pools			Length of Run			Length of Riffles		
#	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Stream Morphology At Transect

From RDB wall - 9%/5°

LDB Angle: Levee - 17%/9° @ 45° RDB Angle: 55%/28°

Secchi (ft) _____ Turbidity (NTU): _____

Channel Comp (%): Cobble 70 Gravel 10 Sand _____ Silt 20

Other

Bank Compostion RDB - Mud, Rock LDB - Concrete wall

Riparian Corridor Density: Width of Riparian Area: RDB ~ 20, LDB - 0

Compostion of Riparian Vegitation: RDB - Trees, shrubs, grass

General Observations: _____

Stream Discharge Measurements

Beginning Stage _____ Ending Stage: _____ Total Q: _____

Channel Width: _____ Total Area: _____ Average Velocity: _____

Distance from Datum to Water Surface: Start: End:

Meas. type: Price AA Pygmy Data Coll. Type: Aqua Calc Sheet Aqua Calc Transect #:

Stream Discharge Measurements

Time	Station #	Angle Coefficient	Distance (from initial Point-ft.)	Width	Depth (ft.)	Observation Depth	Revs.	Interval Time - in seconds	Velocity (f/s)		Adjusted for Hor. Angle	Section Area ($ft.^2$)	Section Discharge (cfs)
									At Point	Mean in Ver-tical			
	1 (EOW)		0		0	0	0	0	0	0			
			1		0.4								
			4		0.91								
			7		1.54								
			10		1.82								
			13		2.20								
			16		2.23								
			19		2.34								
			22		2.30								
			25		2.05								
			28		1.76								
			31		1.60								
			34		1.32								
			37		1.0								
			39		0.4								
			41		0.2								
			42		0								

Log Sheet Totals: _____ _____

Sheet Calculated Discharge: _____

Aqua Calc Discharge: _____

Remarks:

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBID #: 1709	Site Location Description: M. Cr. - 4 (0741488/4290523)
Site Lat/Long: 178	
Date & Time: 10/21/04 10100	Facility Name:
Personnel: NM/CL	Permit Number:
Current Weather Conditions: Cloudy	Weather Conditions for Past 7 days: Cloudy
Photo Ids: Upstream:	Downstream: Other:

pic. #s - 0079 - 0082 control structure pic. #s - 0083 - 0084

Used Observed*:

☐ Swimming	☐ Skin Diving	☐ SCUBA diving	☐ Tubing	☐ Water Skiing
☐ Wind surfing	☐ Kayaking	☐ Boating	☐ Wading	☐ Rafting
☐ Hunting	☐ Trapping	☐ Fishing	☒ None of the above	☐ Other
Describe: (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.				

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

☒ City/county parks	☐ Playgrounds	☐ MDC conservation lands	☒ Urban areas	☐ Campgrounds
☐ Boating accesses	☐ State parks	☐ National forests	☐ Nature trails	☐ Stairs/walkway
☐ No trespass sign	☒ Fence	☒ Steep slopes	☐ Other:	

Evidence of Human Use*:

☐ Roads	☐ Foot paths/prints	☐ Dock/platform	☐ Livestock Watering	☐ RV/ATV Tracks
☐ Rope swings	☐ Camping Sites	☐ Fire pit/ring	☐ NPDES Discharge	☐ Fishing Tackle
☒ Other: Graffiti				

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular recreational use analysis but may point to conditions that need further analysis or that effect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

☐ Riffle	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 45	Length(ft) >500	Ave. Depth(ft) 2.3	Max. Depth(ft) 4.3
☒ Flow	Present? (Yes) No		Estimated (ft^3/sec): 2	

Downstream View Physical Dimensions:

☐ Riffle	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 40	Length(ft) 100	Ave. Depth(ft) 2.0	Max. Depth(ft) 3.5
☒ Flow	Present? (Yes) No		Estimated (ft^3/sec): 2	

Substrate*: (These values should add up to 100%)

70 %Cobble	10 %Gravel	%Sand	20 %Silt	%Mud/Clay	%Bedrock

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Water Characteristics*: (Mark all that apply.)

Odor:	☐ Sewage	☐ Musky	☐ Chemical	☒ None	☐ Other
Color:	☐ Clear	☐ Green	☐ Gray	☐ Milky	☒ Other Brown
Bottom Deposit:	☐ Sludge	☐ Solids	☐ Fine sediments	☒ None	☐ Other
Surface Deposit:	☐ Oil	☐ Scum	☐ Foam	☒ None	☐ Other

Comments: Please attach additional comments (including information from interviews) to this form.

*This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that effect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: [signature] Date: 10/21/04

Organization: MEC Water Resources Position: Environmental Specialist

MEC Water Resources

Stream Morphology & Discharge Measurements

Project Name/Number: MSD UAA

Date/Time: 10/21/04

Site/Transect ID Number: M.Cr.-4

Start Time: 10:00 End Time: 10:25

Measured by: NM/CL Air Temp: 55°F Weather Cond: Cloudy

Stream Morphology Between Transects

	Length of Pools			Length of Run			Length of Riffles		
#	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Stream Morphology At Transect

From RDB wall - 8%/5°

LDB Angle: Levee - 18%/10° @ 48' RDB Angle: 53%/28° Secchi (ft) _____ Turbidity (NTU): 9.99

Channel Comp (%): Cobble 70 Gravel 10 Sand _____ Silt 20

Other

Bank Compostion: Mud & Rock on RDB, Concrete wall on LDB

Riparian Corridor Density: Width of Riparian Area: RDB-20, LDB-0

Compostion of Riparian Vegitation: RDB-Shrubs & forbs

General Observations: Below (Downstream) of transect exists a control structure that raises the upstream water elevation by ~3'

Stream Discharge Measurements

Beginning Stage _____ Ending Stage: _____ Total Q: _____

Channel Width: _____ Total Area: _____ Average Velocity: _____

Distance from Datum to Water Surface: Start: End:

Meas. type: Price AA Pygmy Data Coll. Type: Aqua Calc Sheet Aqua Calc Transect #:

Stream Discharge Measurements

Time	Station #	Angle Coefficient	Distance (from initial Point-ft.)	Width	Depth (ft.)	Observation Depth	Revs.	Interval Time - in seconds	Velocity (f/s)		Adjusted for Hor. Angle	Section Area ($ft.^2$)	Section Discharge (cfs)
									At Point	Mean in Vertical			
	1 (EOW)		0			0	0	0	0	0			
			1		0.4								
			4		0.4								
			7		2.15								
			10		3.15								
			14		3.40								
			18		3.55								
			22		3.8								
			26		3.9								
			28		4.3								
			30		2.6								
			34		1.0								
			38		0.8								
			42		0.5								
			46		0.3								
			47		0.3								
			48		0								

Log Sheet Totals: _____

Sheet Calculated Discharge: _____

Aqua Calc Discharge: _____

Remarks:

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBID #: 1709	Site Location Description: M.Cr. - 5 (0741629 / 4290323)
Site Lat/Long: 179	
Date & Time: 10/21/04 1013O	Facility Name:
Personnel: NM/CL	Permit Number:
Current Weather Conditions: Cloudy	Weather Conditions for Past 7 days: Cloudy
Photo Ids: Upstream:	Downstream: Other:

pic #s - 0085 - 0088

Used Observed*:

☐ Swimming	☐ Skin Diving	☐ SCUBA diving	☐ Tubing	☐ Water Skiing
☐ Wind surfing	☐ Kayaking	☐ Boating	☐ Wading	☐ Rafting
☐ Hunting	☐ Trapping	☐ Fishing	☒ None of the above	☐ Other

Describe: (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

☐ City/county parks	☐ Playgrounds	☐ MDC conservation lands	☒ Urban areas	☐ Campgrounds
☐ Boating accesses	☐ State parks	☐ National forests	☐ Nature trails	☐ Stairs/walkway
☐ No trespass sign	☒ Fence	☒ Steep slopes	☐ Other:	

Evidence of Human Use*:

☐ Roads	☒ Foot paths/prints	☐ Dock/platform	☐ Livestock Watering	☐ RV/ATV Tracks
☐ Rope swings	☐ Camping Sites	☐ Fire pit/ring	☒ NPDES Discharge	☐ Fishing Tackle
☒ Other: Grafitti near MSD outfall				

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular recreational use analysis but may point to conditions that need further analysis or that effect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

☒ Riffle	Width(ft) 40	Length(ft) 500	Ave. Depth(ft) 0.1	Max. Depth(ft) 0.2
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☐ Pool	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Flow	Present? (Yes)	No	Estimated (ft^3/sec): 3	

Downstream View Physical Dimensions:

☒ Riffle	Width(ft) 20 ~~40~~	Length(ft) 20	Ave. Depth(ft) 0.1	Max. Depth(ft) 0.2
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 40	Length(ft) 300	Ave. Depth(ft) 0.7	Max. Depth(ft) 1.7
☒ Flow	Present? (Yes)	No	Estimated (ft^3/sec): 3	

Substrate*: (These values should add up to 100%)

%Cobble	%Gravel	%Sand	%Silt	%Mud/Clay	100 %~~Bedrock~~ Concrete

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Some benthic Algae

Water Characteristics*: (Mark all that apply.)

Odor:	☐ Sewage	☐ Musky	☐ Chemical	☒ None	☐ Other
Color:	☒ Clear	☐ Green	☐ Gray	☐ Milky	☐ Other
Bottom Deposit:	☐ Sludge	☐ Solids	☐ Fine sediments	☒ None	☐ Other
Surface Deposit:	☐ Oil	☐ Scum	☐ Foam	☒ None	☐ Other

Comments: Please attach additional comments (including information from interviews) to this form.

*This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that effect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: Cassidy Lindberg Date: 10/21/04

Organization: MEC Water Resources Position: Environmental Specialist

MEC Water Resources

Stream Morphology & Discharge Measurements

Project Name/Number: MSD UAA

Date/Time: 10/21/04

Site/Transect ID Number: M.Cr.-5

Start Time: 10:30 End Time: 10:45

Measured by: NM/CL Air Temp: 55°F Weather Cond: Cloudy

Stream Morphology Between Transects

	Length of Pools			Length of Run			Length of Riffles		
#	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

From RDB

Stream Morphology At Transect

LDB Angle: 20%/11.5° @43.5' RDB Angle: 42%/22° Secchi (ft) _____ Turbidity (NTU): _____

Channel Comp (%): Cobble _____ Gravel _____ Sand _____ Silt _____

Other Concrete - 100

Bank Compostion Concrete, Mud, Rock

Riparian Corridor Density: Width of Riparian Area: LDB ~ 5', RDB ~ 20'

Compostion of Riparian Vegitation: Early stage trees

General Observations: Directly below RR & Highway bridges, near the end of entire concrete channel.

Stream Discharge Measurements

Beginning Stage _____ Ending Stage: _____ Total Q: _____

Channel Width: _____ Total Area: _____ Average Velocity: _____

Distance from Datum to Water Surface: Start: End:

Meas. type: Price AA Pygmy Data Coll. Type: Aqua Calc Sheet Aqua Calc Transect #:

Stream Discharge Measurements

Time	Station #	Angle Coefficient	Distance (from Initial Point-ft.)	Width	Depth (ft.)	Observation Depth	Revs.	Interval Time - in seconds	Velocity (f/s) At Point	Velocity (f/s) Mean in Vertical	Adjusted for Hor. Angle	Section Area (ft.^{2})	Section Discharge (cfs)
	1 (EOW)		0		0	0	0	0	0	0			
			9.5		0								
			13.5		0.1								
			17.5		0.15								
			21.5		0.28								
			25.5		0.25								
			29.5		0.10								
			33.5		0.06								
			35.5		0								
			43.5		0								

Log Sheet Totals:

Sheet Calculated Discharge:

Aqua Calc Discharge:

Remarks:

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBID #: 1709	Site Location Description: M.Cr. – 6 (0741850/4290202)
Site Lat/Long: 180	
Date & Time: 10/21/04 10:55	Facility Name:
Personnel: NM/CC	Permit Number:
Current Weather Conditions:	Weather Conditions for Past 7 days: Cloudy
Photo Ids: Upstream:	Downstream: Other:

pic #s - 0089 - 0095

Used Observed*:

☐ Swimming	☐ Skin Diving	☐ SCUBA diving	☐ Tubing	☐ Water Skiing
☐ Wind surfing	☐ Kayaking	☐ Boating	☐ Wading	☐ Rafting
☐ Hunting	☐ Trapping	☐ Fishing	☒ None of the above	☐ Other
Describe: (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.				

Surrounding Conditions*: (Mark all that promote or impede recreational uses. Attach photos of evidence or unusual items of interest.)

☐ City/county parks	☐ Playgrounds	☐ MDC conservation lands	☐ Urban areas	☐ Campgrounds
☐ Boating accesses	☐ State parks	☐ National forests	☐ Nature trails	☐ Stairs/walkway
☐ No trespass sign	☒ Fence	☒ Steep slopes	☐ Other:	

Evidence of Human Use*:

☐ Roads	☐ Foot paths/prints	☐ Dock/platform	☐ Livestock Watering	☐ RV/ATV Tracks
☐ Rope swings	☐ Camping Sites	☐ Fire pit/ring	☒ NPDES Discharge	☐ Fishing Tackle
☒ Other: Grafitti at bridge ↑ above site				

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular recreational use analysis but may point to conditions that need further analysis or that effect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

☒ Riffle	Width(ft) ~~150~~ ~~40~~ 30	Length(ft) 150	Ave. Depth(ft) 0.1	Max. Depth(ft) 0.2
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 20	Length(ft) 150	Ave. Depth(ft) 0.5	Max. Depth(ft) 0.7
☒ Flow	Present? (Yes) No		Estimated (ft³/sec): 3	

Downstream View Physical Dimensions:

☒ Riffle	Width(ft) 50'	Length(ft) 100	Ave. Depth(ft) .1	Max. Depth(ft) .2
☐ Run	Width(ft)	Length(ft)	Ave. Depth(ft)	Max. Depth(ft)
☒ Pool	Width(ft) 75	Length(ft) 500	Ave. Depth(ft)	Max. Depth(ft)
☒ Flow	Present? (Yes) No		Estimated (ft³/sec): 3	

Substrate*: (These values should add up to 100%)

20 %Cobble	%Gravel	%Sand	%Silt	%Mud/Clay	80 %~~Bedrock~~ Concrete

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Some benthic Algae

Water Characteristics*: (Mark all that apply.)

Odor:	☐ Sewage	☐ Musky	☐ Chemical	☒ None	☐ Other
Color:	☒ Clear	☐ Green	☐ Gray	☐ Milky	☐ Other
Bottom Deposit:	☐ Sludge	☐ Solids	☐ Fine sediments	☒ None	☐ Other
Surface Deposit:	☐ Oil	☐ Scum	☐ Foam	☒ None	☐ Other

Comments: Please attach additional comments (including information from interviews) to this form.

*This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that effect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: [signature] Date: 10/21/04

Organization: MEC Water Resources Position: Environmental Specialist

MEC Water Resources

Stream Morphology & Discharge Measurements

Project Name/Number: MSD UAA

Date/Time: 10/21/04

Site/Transect ID Number: M.Cr - 6

Start Time: 10:55 End Time: 11:10

Measured by: NM/CL Air Temp: 55°F Weather Cond: Cloudy

Stream Morphology Between Transects

	Length of Pools			Length of Run			Length of Riffles		
#	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #	ft.	Start GPS #	End GPS #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Stream Morphology At Transect

Taken from LDB

LDB Angle: 32%/17° RDB Angle: 18%/10° @ 55' Secchi (ft) _____ Turbidity (NTU): _____

Channel Comp (%): Cobble 20 Gravel _____ Sand _____ Silt _____

Other 80% Concrete

Bank Compostion Rocks, Mud

Riparian Corridor Density: Width of Riparian Area: LDB - 40', RDB - 10'

Compostion of Riparian Vegitation: Trees, shrubs

General Observations: Last transect, Creek drops ~20' below transect level at RR bridge. Below bridge is large (150 yds long x ~75' wide) backwater pool beginning at the MS river

Stream Discharge Measurements

Beginning Stage _____ Ending Stage: _____ Total Q: _____

Channel Width: _____ Total Area: _____ Average Velocity: _____

Distance from Datum to Water Surface: Start: End:

Meas. type: Price AA Pygmy Data Coll. Type: Aqua Calc Sheet Aqua Calc Transect #:

Stream Discharge Measurements

Time	Station #	Angle Coefficient	Distance (from initial Point-ft.)	Width	Depth (ft.)	Observation Depth	Revs.	Interval Time - in seconds	Velocity (f/s)		Adjusted for Hor. Angle	Section Area ($ft.^2$)	Section Discharge (cfs)
									At Point	Mean in Vertical			
	1 (EOW)		0			0	0	0	0	0			
			1										
			7										
			13										
			19										
			25										
			31										
			37										
			40										
			41										
			44										
			47										
			50										
			52										

Log Sheet Totals:

Sheet Calculated Discharge:

Aqua Calc Discharge:

Remarks:

Appendix B. Maline Creek Lateral Transects

Site #1	
Distance (ft.)	Depth (ft.)
0	0
0.5	0.1
5.5	0.1
10.5	0.06
15.5	0.03
20.5	0.04
25.5	0.05
30.5	0.1
32.5	0.05
33.5	0

Site #2	
Distance (ft.)	Depth (ft.)
0	0
1	0.4
3	1.15
7	1.3
12	1.82
17	1.9
22	1.9
27	1.4
32	0.7
37	0.8
42	0.7
47	0.5
52	0.4
53	0

Site #3	
Distance (ft.)	Depth (ft.)
0	0
1	0.4
4	0.91
7	1.54
10	1.82
13	2.2
16	2.23
19	2.34
22	2.3
25	2.05
28	1.76
31	1.6
34	1.32
37	1
39	0.4
41	0.2
42	0

Site #4	
Distance (ft.)	Depth (ft.)
0	0
1	0.4
4	0.4
7	2.15
10	3.15
14	3.4
18	3.55
22	3.8
26	3.9
28	4.3
30	2.6
34	1
38	0.8
42	0.5
46	0.3
47	0.3
48	0

Site #5	
Distance (ft.)	Depth (ft.)
0	0
4	0.1
8	0.15
12	0.28
16	0.25
20	0.1
24	0.06
26	0

Site #6	
Distance (ft.)	Depth (ft.)
0	0.00
1	0.15
7	0.20
13	0.10
19	0.10
25	0.10
31	0.10
37	0.10
40	0.10
41	0.75
44	0.60
47	0.30
50	0.30
52	0.00

Appendix C. Maline Creek Water Quality Data

USGS Water Quality Data Collected at USGS 7005000 Maline Creek near Bellefontaine Neighbors (38°44'12.36", -90°,12',34.27" NAD 83)

Date/Time	Streamflow	Specific Conductivity	Fecal Coliform	*E. coli*	Condition	Recreation Season
(M/D/Y 24:00)	(cfs)	(uS/cm)	(col./100 mL)	(col./100 mL)	(Baseflow, Runoff)	(Yes, No)
8/1/96 9:45	4.6	558	3,400	2,900	Baseflow	Yes
9/23/96 15:30	940.0	147	57,000	54,000	Runoff	Yes
12/11/96 11:30	5.0	57	84	-----	Baseflow	No
3/5/97 13:15	8.0	1,100	860	350	Baseflow	No
5/25/97 23:50	779.0	554	46,000	60,000	Runoff	Yes
6/10/97 9:15	5.0	1,160	430	910	Baseflow	Yes
8/26/97 8:30	2.0	551	5,000	4,300	Baseflow	Yes
9/2/97 16:34	-----	151	3,600	1,000	unknown	Yes
12/15/97 14:50	2.7	3,570	880	500	Baseflow	No
2/24/98 10:45	5.4	1,240	230	100	Baseflow	No
4/15/98 6:55	478.0	249	54,000	40,000	Runoff	Yes
6/23/98 8:15	7.0	522	2,600	1,700	Baseflow	Yes
12/1/98 10:35	6.3	947	1,200	1,100	Baseflow	No
2/10/99 13:55	12.0	1,110	2,400	1,100	Baseflow	No
2/11/99 16:30	749.0	646	28,000	24,000	Runoff	No
5/4/99 23:22	492.0	807	34,000	23,000	Runoff	Yes
6/17/99 12:35	2.7	750	610	540	Baseflow	Yes
8/3/99 9:40	1.6	563	1,400	800	Baseflow	Yes
12/9/99 15:43	307.0	269	6,800	10,000	Runoff	No
1/6/00 10:05	0.5	346	1,000	2,400	Baseflow	No
2/29/00 9:58	3.0	716	160	240	Baseflow	No
4/7/00 3:38	300.0	657	7,200	5,800	Runoff	Yes
6/15/00 10:15	5.4	454	6,000	400	Baseflow	Yes
8/1/00 12:00	4.2	417	1,500	1,600	Baseflow	Yes
12/18/00 17:10	2.2	5,180	600	1,300	Baseflow	No
2/9/01 10:54	173.0	1,110	4,000	1,200	Runoff	No
2/27/01 15:55	9.0	1,090	240	210	Baseflow	No
4/10/01 23:31	351.0	790	600,000	280,000	Runoff	Yes
5/29/01 15:40	0.3	564	2,800	3,000	Baseflow	Yes
8/27/01 13:45	0.6	359	1,500	760	Baseflow	Yes
10/24/01 0:45	61.0	536	11,000	7,000	Runoff	Yes
12/10/01 17:00	1.7	1,050	46	42	Baseflow	No
2/5/02 9:00	6.4	1,280	54	120	Baseflow	No
3/9/02 3:32	171.0	2,120	1,000	800	Runoff	No
5/30/02 8:15	6.0	594	2,900	2,500	Baseflow	Yes
8/8/02 11:30	3.9	436	2,200	730	Baseflow	Yes
10/29/02 5:16	180.0	454	13,000	16,000	Runoff	Yes
12/17/02 9:35	3.2	3,710	1,200	1,600	Baseflow	No
2/4/03 10:15	9.0	1,810	310	140	Baseflow	No
4/16/03 21:09	416.0	548	14,000	12,000	Runoff	Yes
6/9/03 14:25	6.0	788	1,300	640	Baseflow	Yes
8/12/03 9:40	0.8	670	1,400	480	Baseflow	Yes
10/9/03 14:42	422.0	226	22,000	21,000	Runoff	Yes
2/9/04 14:30	8.6	5,870	20	10	Baseflow	No
3/4/04 12:38	544.0	604	11,000	4,800	Runoff	No
5/17/04 14:15	13.0	971	1,000	150	Baseflow	Yes
8/4/04 10:00	3.0	533	7,200	9,400	Baseflow	Yes

Appendix D

Maline Creek
Recreational Use Attainability Interview Forms

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Trent Stober Interviewed by: By Person (By Phone)

Date 4/4/05 Time 18:20

Reason for the interviewee selection Stream Team #888

Location: River Des Peres (Maline Creek)

Description (GPS optional) _____

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name David Kuchenmeister

Current Address 2021 Hord Ave., Jennings, MO 63136

Current Phone # _____

Occupation _____

Age 43 yrs.

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 43 yrs.

Do you or your family utilize River Des Peres and (Maline Creek) for water activities? (YES) or NO

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other Sampling, water quality monitoring, collecting trash			

If **NO**, reasons why Lack of adequate water depth

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other			

If **NO**, reasons why Lack of depth
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECTODAL USE- Characterize the anectodal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other Mr. Kaechenmeister was told that there was a swimming hole years ago in Maline Creek far upstream of study reach at S. Florrisant Rd & Suburban Rd.			

If **NO**, reasons why _____
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor _____

Signature of Interviewed Individual _____

Date 4/4/05

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Renee Marten Interviewed by: By Person (By Phone)

Date 1/10/05 Time 9:25 AM

Reason for the interviewee selection Stream gaging stations on Rivers/creek

Location: (River Des Peres) (Maline Creek)

Description (GPS optional) Bellefontaine, Perdue, Magan Ford.

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Larry Buschmann

Current Address WRes. Field Office Rolla - USGS

Current Phone # 573-308-3683

Occupation Hydrologic Tech

Age 28

PERSONAL USE

How long have you lived near this body of water? —

Do you or your family utilize (River Des Peres) and (Maline Creek) for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	—	—	—
Kayaking	—	—	—
Tubing	—	—	—
Rafting	—	—	—
Boating	—	—	—
Water Skiing	—	—	—
Other	—	—	

If **NO**, reasons why Safety, WQ
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other Work on River & Creek.

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	—	—	—
Kayaking	—	—	—
Tubing	—	—	—
Rafting	—	—	—
Boating	—	—	—
Water Skiing	—	—	—
Other	Drug Dealing		Low

If **NO**, reasons why Safety
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	—	—	—
Kayaking	—	—	—
Tubing	—	—	—
Rafting	—	—	—
Boating	—	—	—
Water Skiing	—	—	—
Other	—	—	—

If **NO**, reasons why WQ, Safety
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor Renee Mart

Signature of Interviewee _____

Date 1/10/05

Bellefontaine
Purdue
Morgan Ford

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Kati Munks Interviewed by (By Person) By Phone

Date 10-21-04 Time 8:45

Reason for the interviewee selection back yard butts up against stream

Location: River Des Peres (Maline Creek)

Description (GPS optional) adjacent to stream on south side

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Refused - lady at 905 Delaird Drive

Current Address

Current Phone #

Occupation

Age

PERSONAL USE

How long have you lived near this body of water? Refused

Do you or your family utilize River Des Peres and Maline Creek for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why Aesthetics, Safety
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other - Just maintenance crews			

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor _____

Signature of Interviewee _____

Date 10-21-04

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM

River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Nate Meeks Interviewed by: (By Person) By Phone

Date 10-21-04 Time 9:00 a.m

Reason for the interviewee selection Lives on street next to Creek

Location: River Des Peres (Maline Creek)

Description (GPS optional) Laramie street is South of strea

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Annie Cahla

Current Address 9333 Laramie Street

Current Phone # (314) 388-2172

Occupation house wife

Age 30 3 kids - 9, 5, 2

PERSONAL USE

How long have you lived near this body of water? 4 yrs

Do you or your family utilize River Des Peres and Maline Creek for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why Safety

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	Teenagers playing around every once in a while		

If **NO**, reasons why Lack of depth
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

Signature of Assessor

Signature of Interviewee

Date 10-21-04

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Katie Meenks Interviewed by: (By Person) By Phone

Date 10-21-04 Time 9:25 a.m.

Reason for the interviewee selection Works at Belfontaine Gardens Nursing facility

Location: River Des Peres (Maline Creek)

Description (GPS optional) facility located next to Creek to North

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- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Tanika Thames

Current Address 9500 Belfontaine Rd.

Current Phone # 388-0796

Occupation Medical Record Central Supply

Age —

PERSONAL USE

How long have you ~~lived~~ worked near this body of water? 10 months

Do you or your family utilize River Des Peres and Maline Creek for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A - no reason to visit
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other ____

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor _____

Signature of Interviewee Pamyka Thames

Date 10-21-08

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Nathan Meeks Interviewed by: (By Person) By Phone

Date 10-21-04 Time 9:30

Reason for the interviewee selection Works at Belfontaine Gardens Nursing facility

Location: River Des Peres (Maline Creek)

Description (GPS optional) facility is adjacent to creek - next to Belfontaine Bridge - North of stream

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Valerie Warfers

Current Address 9500 Belfontaine Rd

Current Phone # (314) 388-0796

Occupation Administrator

Age ~

PERSONAL USE

How long have you lived near this body of water? 4 months - lived here entire life

Do you or your family utilize River Des Peres and Maline Creek for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why ~

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other Biological Safety - (mosquitos, snakes)

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor _____

Signature of Interviewee Valerie Porter

Date 10-21-04

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Nathan Meeks Interviewed by: (By Person) By Phone

Date 10-21-04 Time 9:45 a.m.

Reason for the interviewee selection Work for St. Louis County Parks - adjacent to Stream

Location: River Des Peres (Maline Creek)

Description (GPS optional) Bella Fontaine Park – stream flows through park
Bob works at park maintenance shed to North of stream

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Bob Emde

Current Address 9565 Bellefontaine Road

Current Phone # (314) 867 - 8380

Occupation Park Maintenance Supervisor

Age —

PERSONAL USE

How long have you ~~lived~~ worked near this body of water? 2½ yrs

Do you or your family utilize River Des Peres and Maline Creek for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other Don't live around here - just works next to it

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why [redacted] Water Quality
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other No access

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

Signature of Assessor [signature]

Signature of Interviewee [signature] Robert C Eberle

Date 10-21-04

"4 residences w/ septic systems - suspects leaking or malfunction - gets odor of septic system in park drainage on occassion."

MEC Water Resources
The Science of Water Quality

RECREATIONAL USE SURVEY FORM
River Des Peres and Maline Creek

The purpose of this survey is to aid in identifying current recreational uses of the River Des Peres and Maline Creek.

Assessor Nate Mueller Interviewed by: (By Person) By Phone

Date 10-21-04 Time 10:35 a.m.

Reason for the interviewee selection Works in Westrich Trucking Co. Facility

Location: River Des Peres (Maline Creek)

Description (GPS optional) Borders Creek to North

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Jack Thomas

Current Address 6000 St. CYR Rd

Current Phone # (314) 494-1024

Occupation Artist

Age 47

PERSONAL USE

How long have you lived near this body of water? 4 yrs

Do you or your family utilize River Des Peres and Maline Creek for water activities? YES or (NO)

If **YES**, please check the activities and approximate number of time and the season you did.

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other No access - fenced

WITNESSED USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other Has seen maintenance crews

ANECTODAL USE

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	0		

If **NO**, reasons why N/A
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

Signature of Assessor

Signature of Interviewee

Date 10-21-04

Public Comments Received on Maline Creek #1709 in St. Louis City

First Name	Last Name	WB Name	WBID #	Summary of Comments	Date Rec'd	Date Postmarked
Diane	Albright	Maline Creek	1709	She requests that the September 7, 2005, decision be reconsidered. The new state water quality rules apply to these three water bodies, too. It is a matter of public health.	01-Dec-05	25-Dec-05
Mary	Burrows	Maline Creek	1709	StreamTeach proposes the StreamTeach Academy and National Paddlesport Center project at the MSD's Prospect Hill Quarry landfill site in the Maline Creek watershed. Our sport of whitewater paddling is a full-body immersion sport. Our mission regards education and research into water clean to ensure we can safely swim and is absolutely essential for our recreational and competitive programs.	17-Oct-05	Attachment from Herm Smith's email on 10-17-05
Dr. Heinrich	Heissinger	Maline Creek	1709	We should clean up our rivers, like the Rhine River in Europe, and keep them clean. Sooner or later we will be forced to do so anyhow out of concern for the health of our population. The longer we wait, the more difficult and costly it will be.	29-Oct-05	e-mail
Mark & David	Kuechenmeister	Maline Creek	1709	Missouri Stream Team #888 has been monitoring Maline Creek for over seven years. We are totally dedicated to monitoring and helping Maline Creek, and to protect it in its natural state for future generations to enjoy. There are minnow, crayfish and bluegill in the creek. There used to be people who used to swim and fish in the creek. Ferguson, MO wants to put back the swimming and fishing hole and bicycle & walking path near the intersection of Maline Creek and South Florissant Road.	18-Sep-05	e-mail
Mark	Kuechenmeister	Maline Creek	1709	I'm the lead of Missouri Stream Team #888 and we have been monitoring the creek for over 8 years, four times a year (Feb., May, Aug., & Nov.).We walk in the creek, pick up rocks with our bare hands, pickup and identify macroinvertibrates. We test for stream flow, dissolved oxygen, nitrates, conductivity, pH, and turbidity. At least once a year we pull trash out of the creek and plant trees along the banks to help stabilize them. I also have seen some kids fishing in the creek for bluegill.	22-Nov-05	e-mail
John	Lodderhose	Maline Creek	1709	The purpose of this correspondence is to clarify the findings of the Maline Creek WBC recreational use attainability analysis (UAA). The MDNR UAA review results were inconclusive apparently due to lack of WBC information back to November 28, 1975, presence of signs of human presence (graffiti), and stream morphology that may support WBC use. See the comment letter for detailed descriptions.	23-Aug-05	No postmark

First Name	Last Name	WB Name	WBID #	Summary of Comments	Date Rec'd	Date Postmarked
Julie	Marino	Maline Creek	1709	We are Citizens Against River Exemption (CARE), a group of Missourians that fights for the sanitation of our rivers. We are troubled by the decision of the Clean Water Commission to exempt one hundred forty-two rivers from the new water quality rules. Incorporating all rivers under the Clean Water Act's updated water quality rules will prevent civilians from experiencing preventable illnesses.	21-Nov-05	11/19/2005
John	Meyer, M.D.	Maline Creek	1709	Favors maintaining the highest water standards for all our rivers, creeks, and watersheds. The Mississippi River, River des Peres, Maline Creek and Coon Creek are most important to maintain for recreation because they are close to major population centers.	11/27/2005	e-mail
Nathan	Pate	Maline Creek	1709	I don't know where Maline Creek is, however if in an urban area this stream needs to be safe for kids to play in. Children will play in any water body accessible on foot.	10/30/2005	e-mail
William	Reeves, Ph.D.	Maline Creek	1709	Nothing in the UAA of the report on the Commission's findings demonstrates that the hydrologic modifications cannot be operated or modified in such as way as to make the use attainable. Until this determination is made, the Commission must reverse its conclusions and retain WBC for all of Maline Creek.	14-Nov-05	e-mail
Dan	Sherburne	Maline Creek	1709	We strongly object to the capricious nature of this decision as well as the failure to allow public involvement prior to the decision being made. There are multiple opportunities for WBC use along its length, and its urban content makes it all the more likely. The comment explains the neighborhood environment that Maline Creek passes through, including a couple of parks with playgrounds and access to the creek. Graffiti is common along the length of the creek. Photos were provided. See letter for additional descriptions.	28-Nov-05	e-mail
Herman	Smith	Maline Creek	1709	We have a letter from US Representative Clay in support of our StreamTeach Academy which is interested in cleaning up Maline Creek to Clean Water Act standards (above the asbestos area). See StreamTeach and Mary Burrows (Rep. Clay) entries	17-Oct-05	e-mail
	StreamTeach Academy	Maline Creek	1709	MSD's 2004 Strategic and Operating Plan has essentially given up on the Maline Creek watershed. The StreamTeach Academy proposes a living stream table area in which rivers engineers can model the return of our urban creeks to their natural, healthy, and stable conditions. They plan to promote the rehabilitation of Maline Creek.	17-Oct-05	Internet (from Herm Smith's e-mail)

First Name	Last Name	Address	City	State	Zip	Phone	Email
Diane	Albright	8835 Glenwood Dr.	Chesterwood	MO	63126	N/A	N/A
Mary	Burrows	N/A	N/A	N/A	N/A	N/A	N/A
Dr. Heinrich	Heissinger	618 Dougherty View Ct	Des Peres	MO	63131-2214	(314) 821-5270	heihk75@hotmail.com
Mark & David	Kuechenmeister	N/A	N/A	N/A	N/A	N/A	markkstreamteam888@juno.com
Mark	Kuechenmeister	N/A	N/A	N/A	N/A	N/A	markkstreamteam888@juno.com
John	Lodderhose	10 East Grand Avenue	St. Louis	MO	63147-2913	(314) 436-8710	N/A

First Name	Last Name	Address	City	State	Zip	Phone	Email
Julie	Marino	11141 Glacier Drive	St. Louis	MO	63146	N/A	N/A
John	Meyer, M.D.	N/A	N/A	N/A	N/A	N/A	jjsmlem@aol.com
Nathan	Pate	N/A	Ellisville	MO	N/A	N/A	jknp@sbcglobal.net
William	Reeves, Ph.D.	238 West Glendale Road	Webster Groves	MO	63119	N/A	wr_reeves@yahoo.com
Dan	Sherburne	6267 Delmar Blvd., Ste. 2E	St. Louis	MO	63130	(314) 727-0600	dsherburne@mindspring.com
Herman	Smith	Box 9155	St. Louis	MO	63117	(314) 725-1907	hwsmith@umsl.edu
	StreamTeach Academy	N/A	N/A	N/A	N/A	N/A	http://streamteach.org/streamteach_academy.html